



U.S. Department of
Transportation



Intelligent Transportation Systems Standards Fact Sheet

ASTM PS 105-99

September 2002 Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer

Overview

Standards for dedicated short range communication (DSRC) are intended to meet the communications requirements between vehicles and roadside devices, as defined in the National ITS Architecture. An example of where DSRC may be used is in toll collection areas where vehicle identity data can be relayed to toll collection authorities within the area surrounding a tollbooth. Possible applications for DSRC include advanced traveler information systems (ATIS), commercial vehicle operations (CVO), advanced vehicle control systems (AVCS), electronic toll and traffic management systems (ETTM), advanced public transportation systems (APTS), and advanced transportation management systems (ATMS).

To obtain a copy of this standard,
please contact:

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Publication Date: April 2000

What is this standard for?

This standard, **ASTM PS 105-99, Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer**, defines the requirements for the open systems interconnection (OSI) reference model, layer two (data link layer), i.e., methods for ensuring data integrity. This standard provides information for on-board equipment based on both active and backscatter technologies and allows for interoperability between systems based on either one of these technologies. The standard allows for mixed time, frequency, and space division multiple access approaches, all similar to cellular telephone techniques that allow multiple users on a limited number of frequencies.

This standard includes requirements that minimize interference between neighboring sites and between active and backscatter systems. To operate at the power levels allowed in this standard consistent with the out-of-band emissions requirements and to minimize interference between systems and sites, specific frequency designations are made for both active and backscatter up link and down link operations. A critical implication of the use of this standard (along with the physical layer standard, ASTM PS 111-98) is the assumption that the data rate will be 500 kilobytes per second on both the up-link and down-link.

Who uses it?

This standard is intended for equipment manufacturers, system integrators, toll and turnpike agency engineers and procurement specialists, research consultants and other interested individuals and groups.

How is it used?

This standard is used for both wide area (multi-lane, open road) and lane-based applications to deliver messages between vehicles entering a communications zone containing roadside communication equipment. It assures accurate and valid message delivery between moving or stationary vehicles and fixed or portable roadside communication equipment through an air interface. It does not include associated measurement guidelines for verification of the requirements of this standard.

This standard describes a means to ensure data integrity in communications for a variety of ITS applications in both roadway and non-roadway environments that depend upon dedicated short range radio communications. This standard does not address vehicle-to-vehicle communication or communication between different types of roadside equipment.

Scope

This standard, **ASTM PS 105-99, Standard Provisional Specification for Dedicated Short Range Communication (DSRC) Data Link Layer**, defines layer two (data link layer) of the open systems interconnection (OSI) reference model for DSRC equipment. It provides requirements for the communication medium (medium access control) to be used for the exchange of information between roadside equipment and on-board equipment. The roadside equipment controls the protocol, schedules the activation of the onboard equipment, reads from or writes to the onboard equipment, and assures message delivery and validity. Roadside equipment is typically, but not necessarily, installed at a fixed location on the roadway. The onboard equipment is intended for, but not limited to, installation in or on a motor vehicle.

Specifically, this standard addresses and defines:

- Medium access control (MAC) procedures for the standard physical medium;
- Addressing rules and conventions;
- Data flow control procedures;
- Acknowledgement procedures;
- Error control procedures;
- Services provide data link users; and
- Fragmentation control.

The standard includes two primary MAC modes, synchronous and asynchronous. Both modes support time-division multiple access half-duplex communications combined with slotted “Aloha” protocol for activation. The synchronous mode is characterized by a continuous set of slots, which is transmitted continuously and has fixed polling, data communications, and activation phases. The asynchronous mode can vary the transmission of polling sequences, activation attempts or data communications.

Related documents

[ASTM E2158-01 – Standard Specification for Dedicated Short Range Communication \(DSRC\) Physical Layer Using Microwave in the 902-928 MHz Band](#)

[IEEE Std 1455-1999 – Standard for Message Sets for Vehicle/Roadside Communications](#)